University of Idaho

Speech Therapy Application Concept Design Review

Team Dialectric

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Sponsored by: Micron Foundation

Overview

- About **8% of children need speech therapy** globally and while there are many speech therapy apps intended to help these children, most only supplement typical sessions, require a therapist to use, or are of little use for research.

- This project aims to create a one-stop-shop application for speech therapy that is **useful to children, therapists, researchers, and caregivers** alike.

Requirements and Deliverables

User Interface

- A complete interface to **navigate through the application**
- **Intuitive** enough for young children
- Grants therapists, caregivers, and researchers **viewability of patient records** and allows **filtering** of data fields

Audio Parsing

- Patients must be able to **record audio and store it** with their associated account
- Audio recognition software must **parse the audio into text** and filter out any background noise

Security

- Ensure only users with proper credentials can access patient data
- **Authenticate users** before every database access request

Interface Design

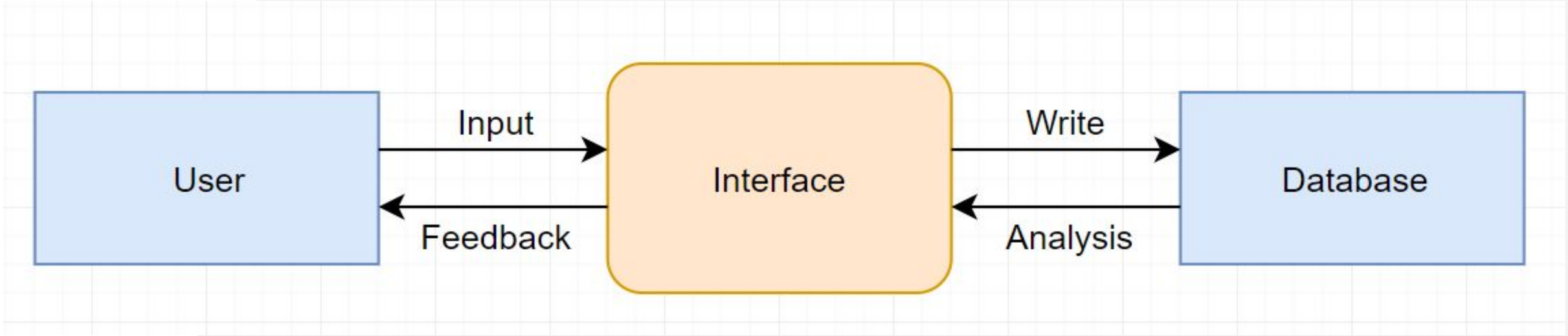
Programming Framework: Angular

- All-in-one
- Platform agnostic
- Scalability
- Longevity

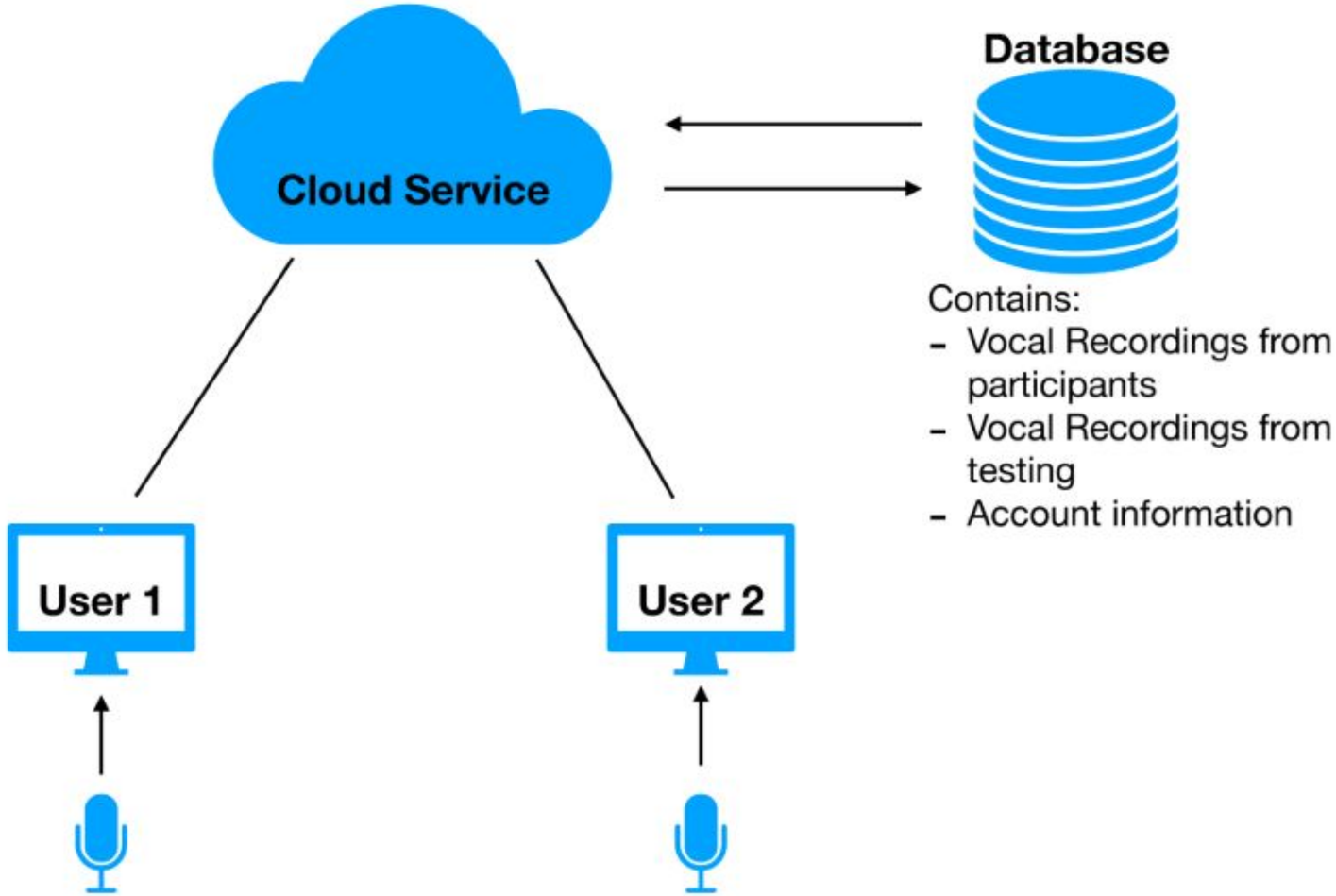
Alternatives:

- React
- Javascript
- PyQT

Interface Context Diagram



Interface Context Diagram

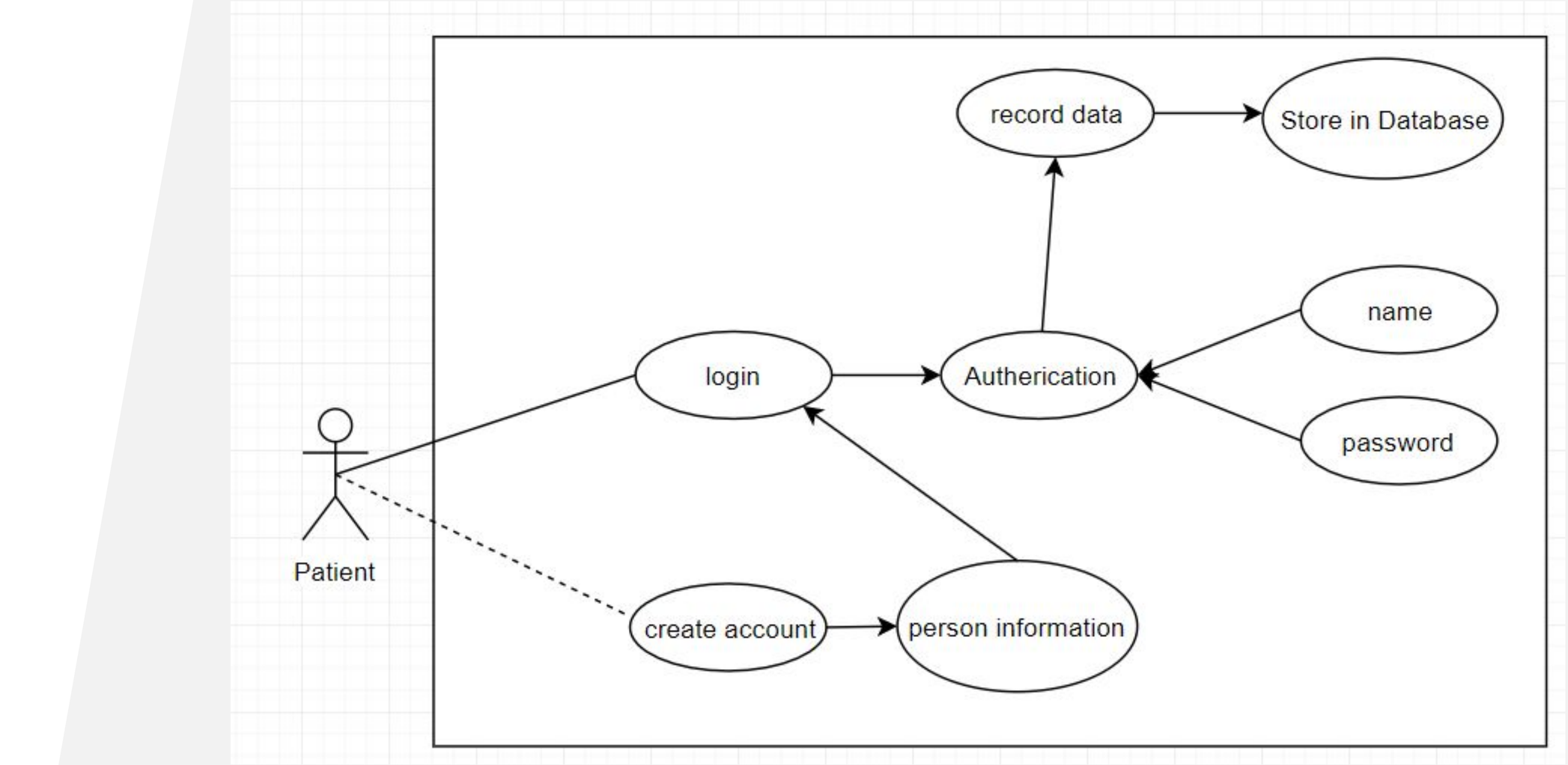


*Note: Can have multiple users.

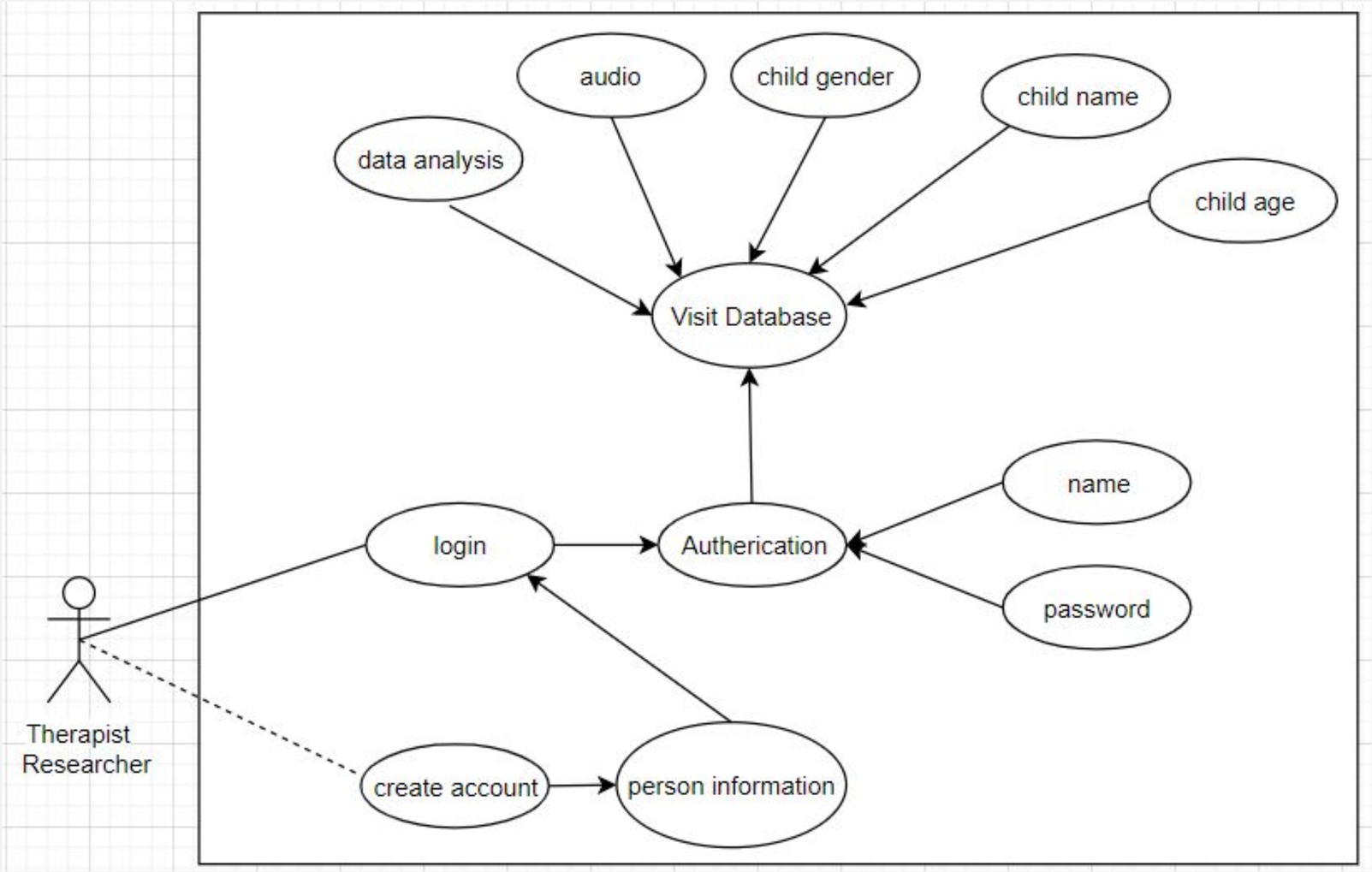
Design Priority

1. Basic: user identification (login & password)
2. Important:
   a. Record user audio
      i. Obey HIPAA and COPPA
   b. User database security
      i. The children's account should have permission to write into the text-to-speech API
      ii. The therapy should get the recognition speech database
         1. Access the original dataset
         2. Read privilege for audio file
         3. Can filtered the data
3. Inferior
   a. Speech recognition feedback

Patient Interface Interaction



Therapist/Researcher Interface Interaction



Interface Constraints

- **Library Bloat**
- **Angular learning curve**

Data Collection

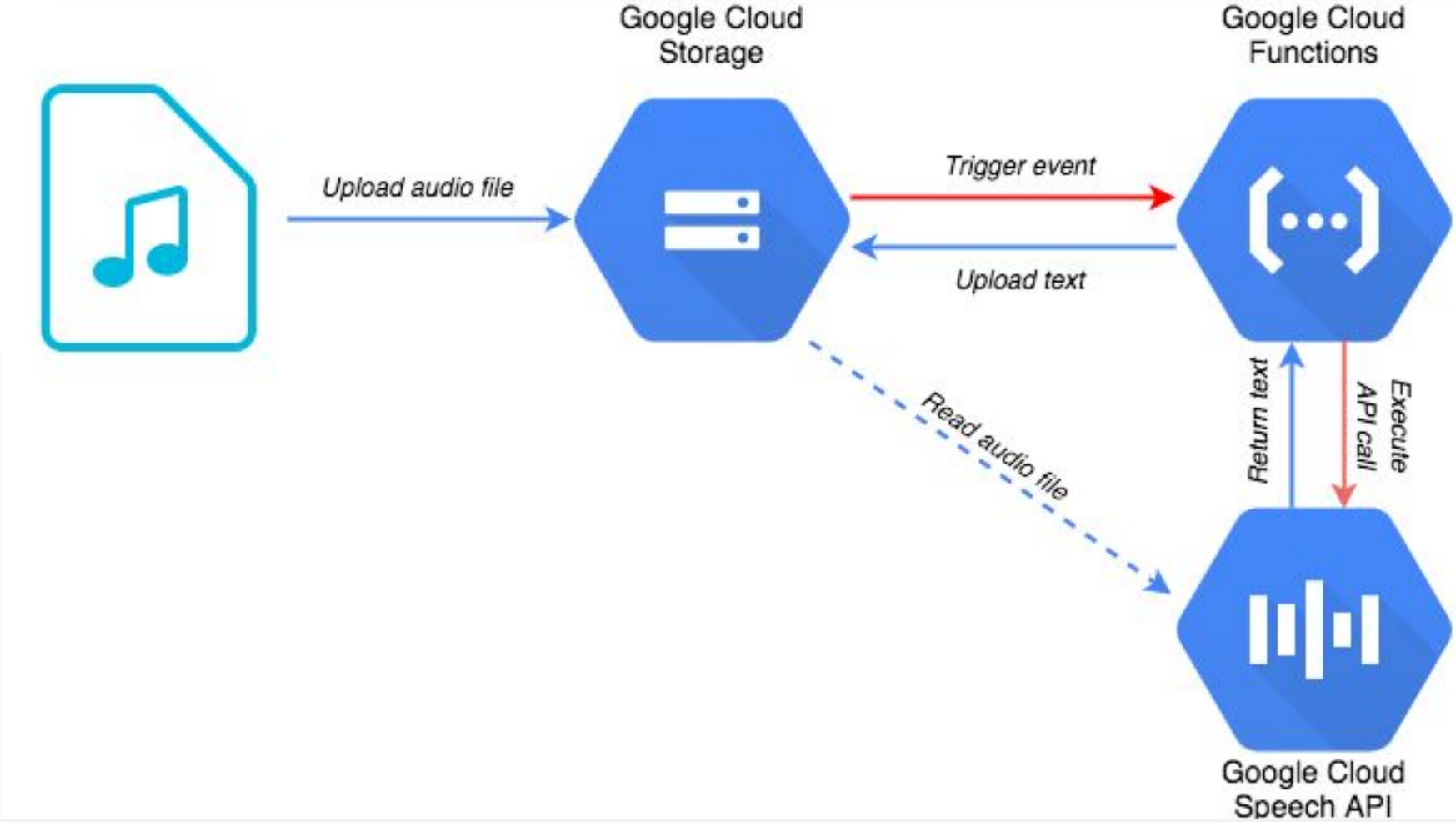
Database Framework: MySQL

- Used as framework for previous project work
- Modern standard
- Fast

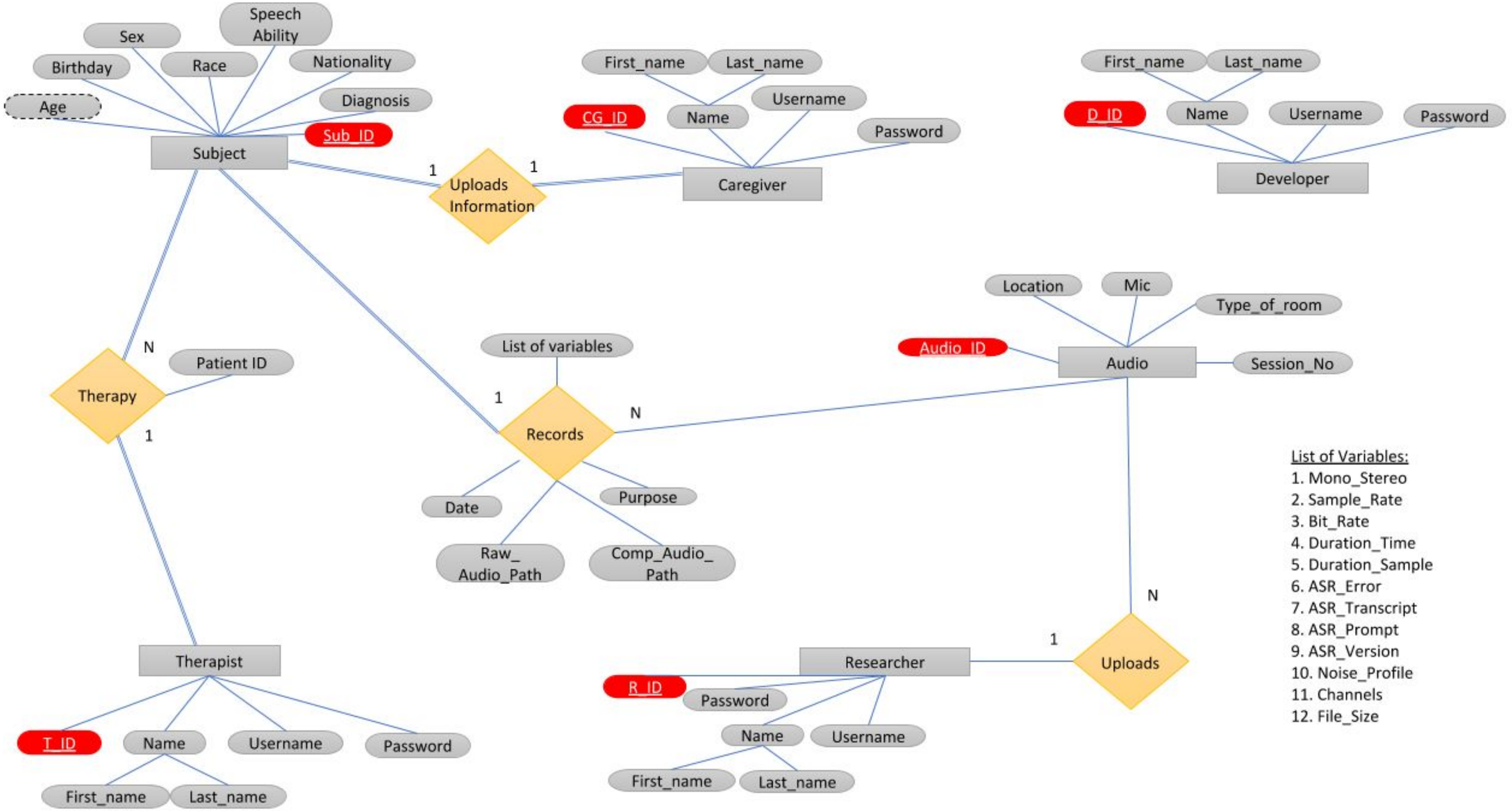
Audio Parsing: Google Speech-to-Text API

- Recognizes over 100 languages
- Diarization features
- Same system used in Google Translate

Speech-to-Text API Flow



Previous Project Database Structure



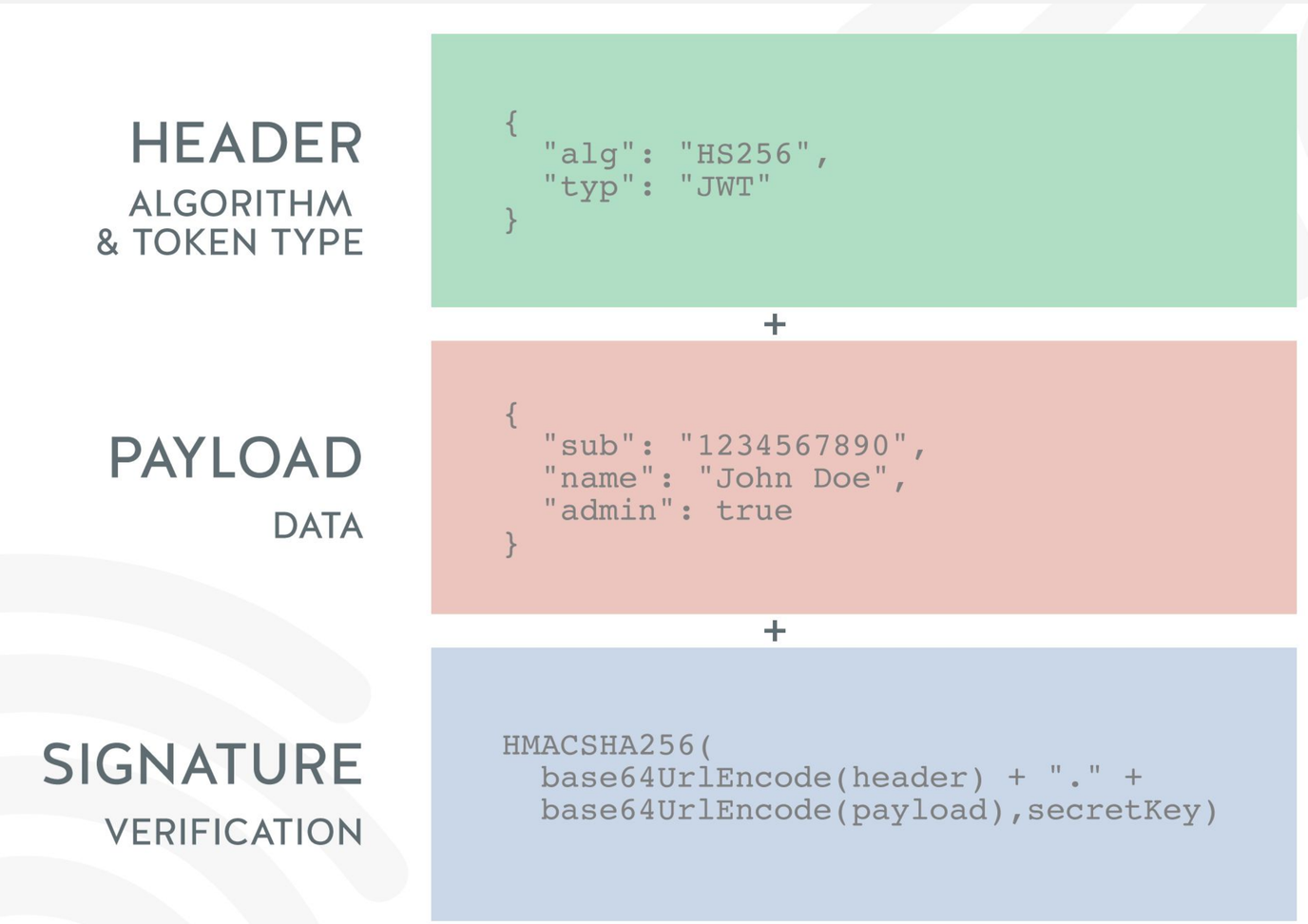
Data Collection Constraints

- Google Cloud Storage Limits
- Internet Connectivity

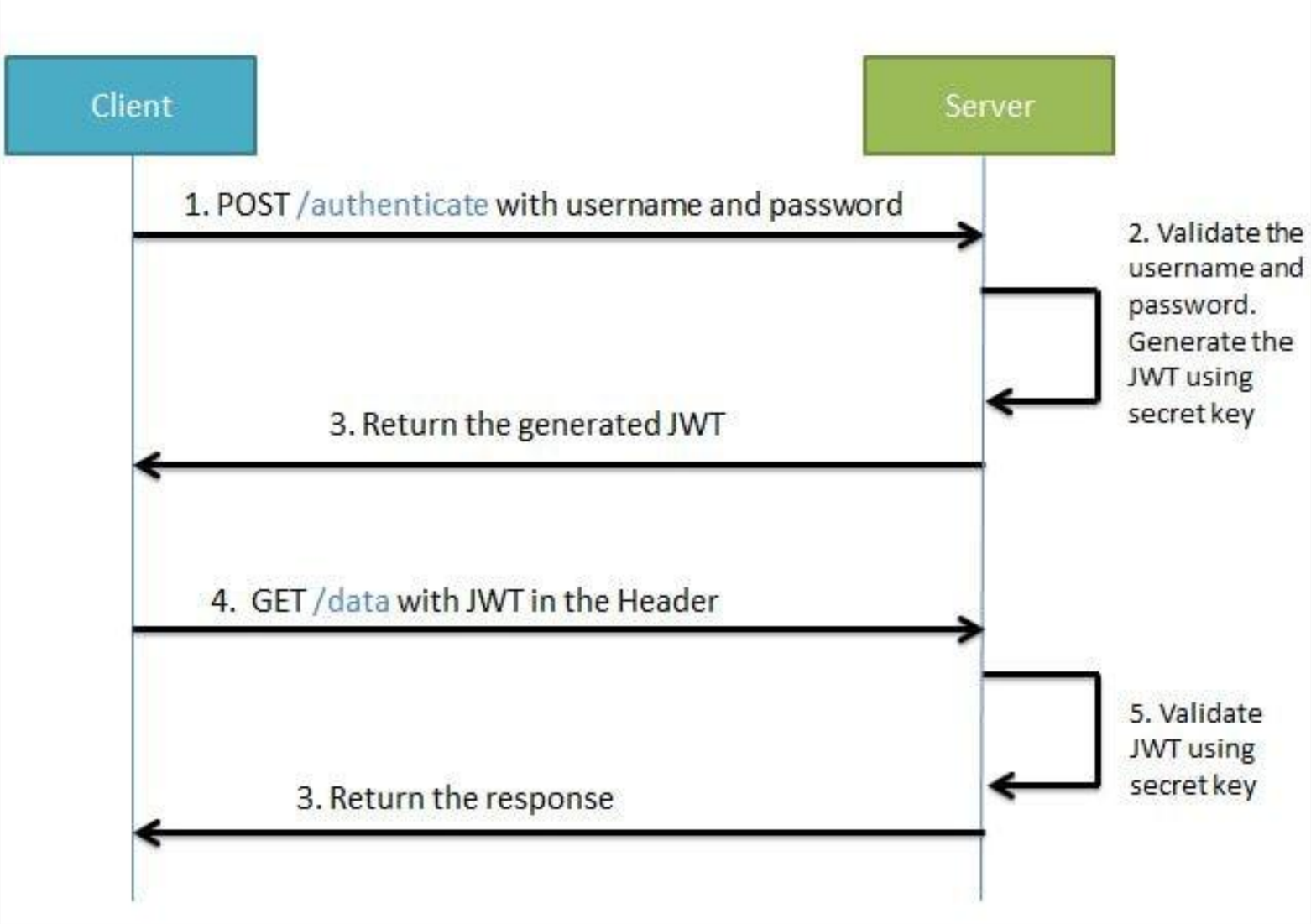
Security Design

Authentication Method: JSON Web Token (JWT)

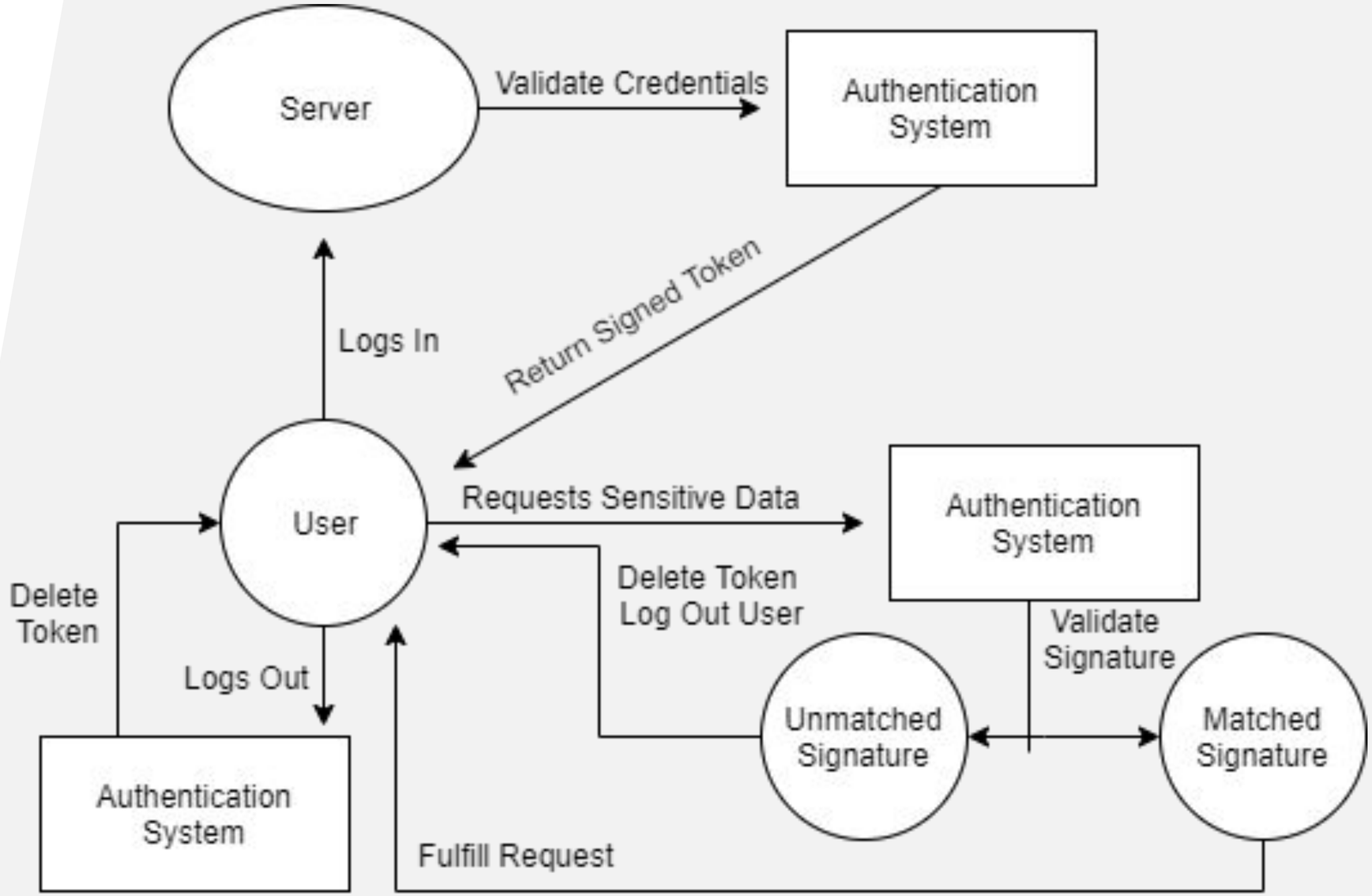
- **Stateless**
- **Horizontal scalability**
- **XSS prevention**



JWT Authentication Flow



Application Authentication Flow



Authentication Alternatives

- **Session-based (cookies)**
- **Hashing (current system)**

Security Constraints

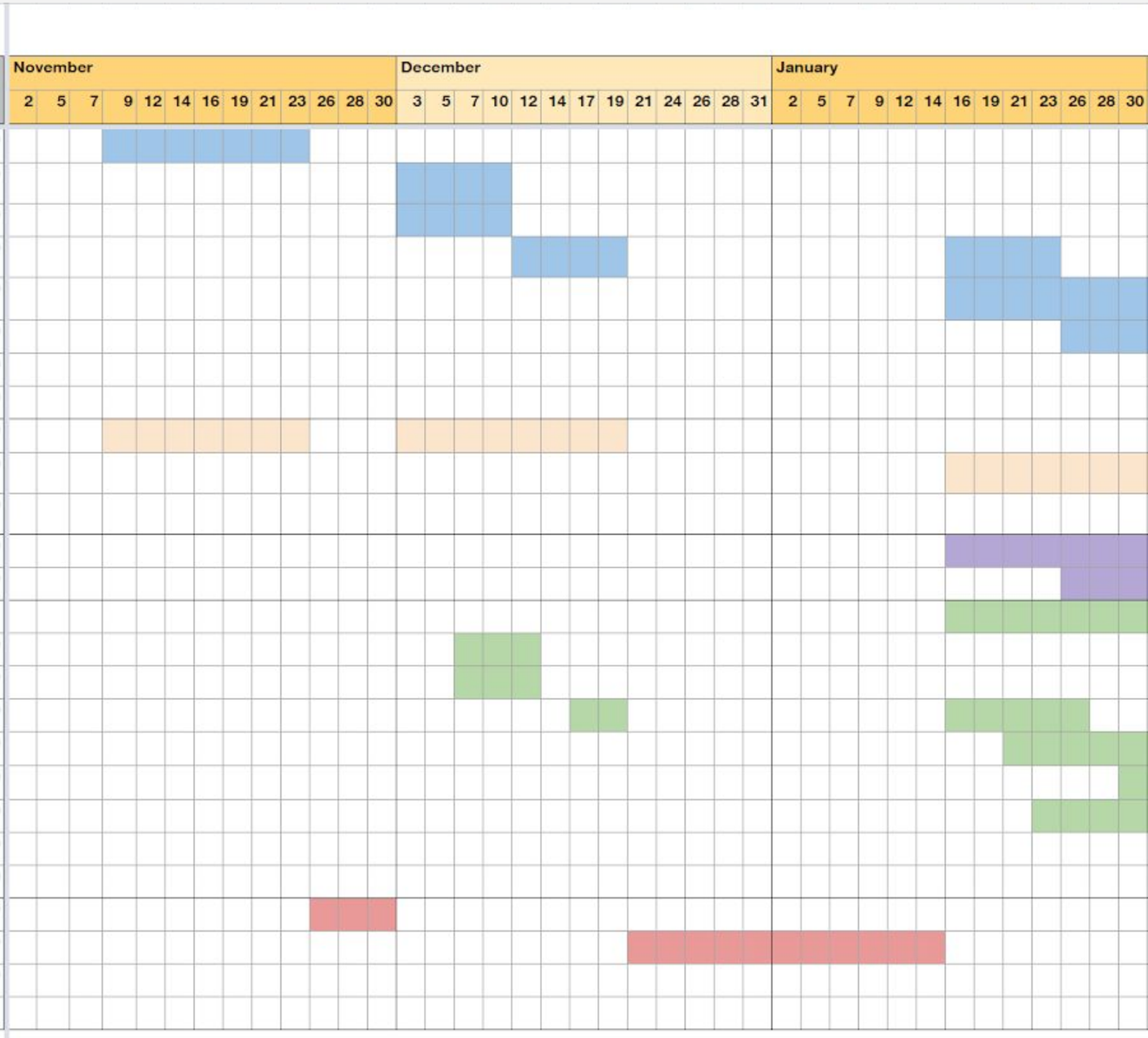
HIPAA & COPPA Compliance

- HIPAA (Health Insurance Portability and Accountability Act)
- COPPA (Children Online Privacy Protection Act)
- Both acts require a reasonable security system to protect medical and personal data

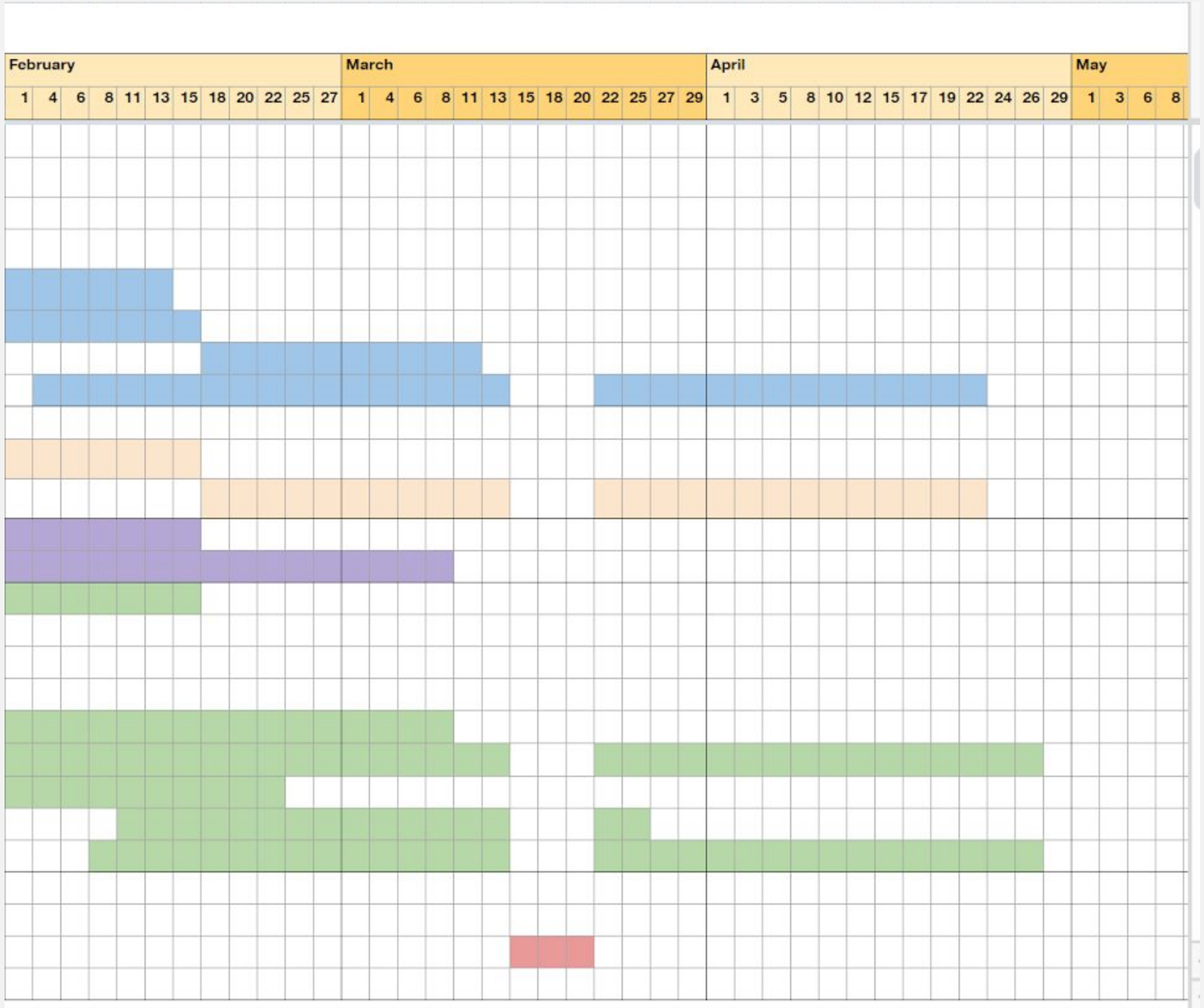
Schedule

Dialectric Schedule

Project Section	Task	Start Date	End Date
User Interface	Design and Planning Phase	11/9/2019	11/23/2019
	Basic Login Screen Implementation	12/3/2019	12/10/2019
	Basic Menu Implementation	12/3/2019	12/10/2019
	Basic Lessons Interface Implementation	12/12/2019	1/23/2020
	Basic User-Based Records Screen Implementation	1/16/2020	1/23/2020
	Interface Decoration Phase	1/26/2020	2/15/2020
	Animations Implementation	2/18/2020	3/11/2020
	Interface Feedback/ Editing	2/4/2020	4/22/2020
Security	Design Phase	11/9/2019	12/23/2019
	Account/Login Security Overhaul	1/16/2020	2/11/2020
	Authentication System Implementation	2/18/2020	4/22/2020
Data	Audio Recording and Storage	1/16/2019	2/15/2019
	Records Filtering	1/26/2019	3/10/2019
Testing	Google Cloud API Testing		
	Login Interface Testing	12/7/2019	12/12/2019
	Menu Interface Testing	12/7/2019	12/12/2019
	Lessons Interface Testing	12/17/2019	1/26/2020
	Records Interface Testing	1/21/2020	3/10/2020
	Misc. Interface Testing	1/30/2020	4/26/2020
	Login Security Testing	1/23/2020	2/22/2020
	Authentication Security Testing	2/11/2020	3/25/2020
	Misc. Security Testing	2/8/2020	4/26/2020
School Schedule	Thinksgiving Holiday	11/25/2019	11/28/2019
	Winter Break	12/21/2019	1/15/2019
	Spring Beak	3/16/2019	3/20/2019



Schedule Continued



Budget

Capstone Project Budget Template - Fall/Spring

Project:

Last Updated 9/29/2019

Expense Items	Year								Item Total
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	
Equipment/Tools:									
Hosting	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 800
Travel:									
Trip to Boise								$ 750	$ 750
									$ -
Supplies / Parts / Services:									
Poster Supplies								$ 80	$ 80
									$ -
									$ -
									$ -
									$ -
									$ -
									$ -
									$ -
									$ -
									$ -

		Expenses
	$ 1,630	Subtotal

Thank You!

Any Questions?